

Onsite Wastewater Treatment Technologies

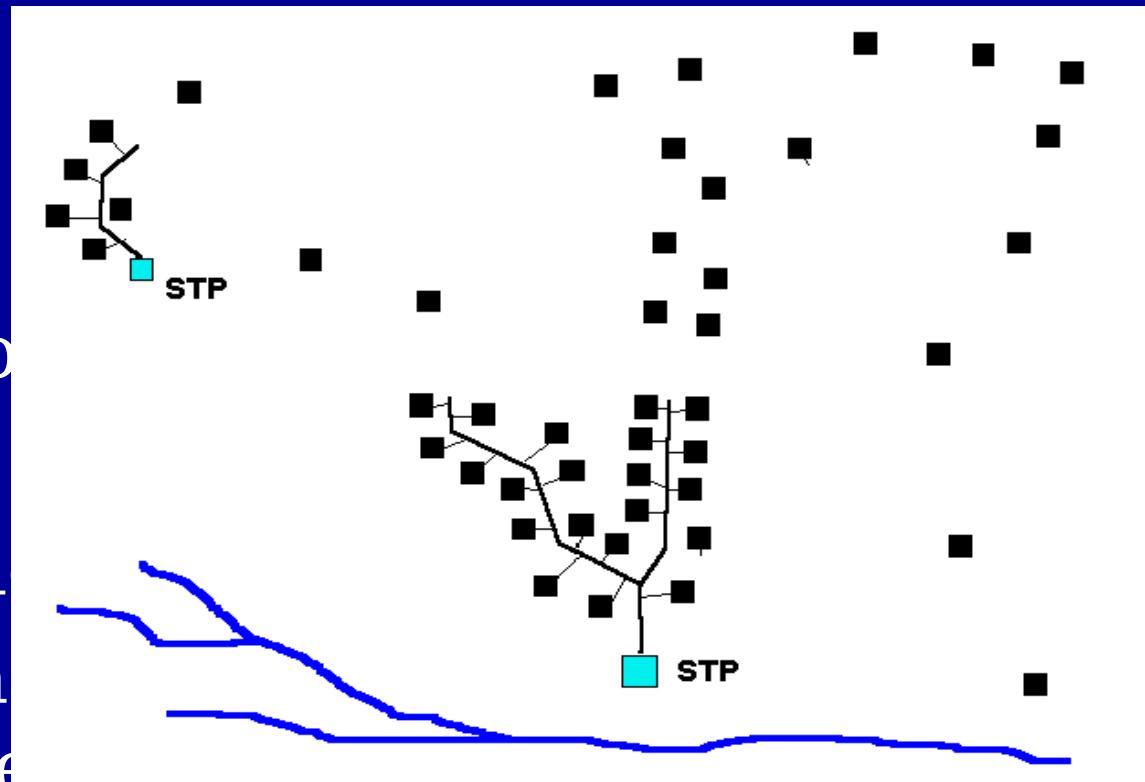
Bruce J. Lesikar

Associate Professor

Texas Cooperative Extension
Texas A&M University System

Decentralized Wastewater Treatment

- Appropriate cost effective systems.
 - Onsite
 - Cluster
 - Centralized
- Public perception
- Failed systems
- New Technologies
- Different from a centralized sewer



Onsite Wastewater Treatment Systems?



- Rural and Exurban wastewater infrastructure
- Water Quality Protection
- 40%, Wastewater Infrastructure

Permitting Dispersal Systems

- TCEQ, Chapter 285, 5000 gallons per day or less
- TCEQ, Chapter 317, Greater than 5000 gallons per day.
- Additional requirements for 317 Permits
 - Potential groundwater impact due to water quality and mounding potential
 - Detailed soil analysis
 - Location of water wells within $\frac{1}{2}$ mile
 - Uniformity of effluent distribution

Onsite Wastewater Treatment System

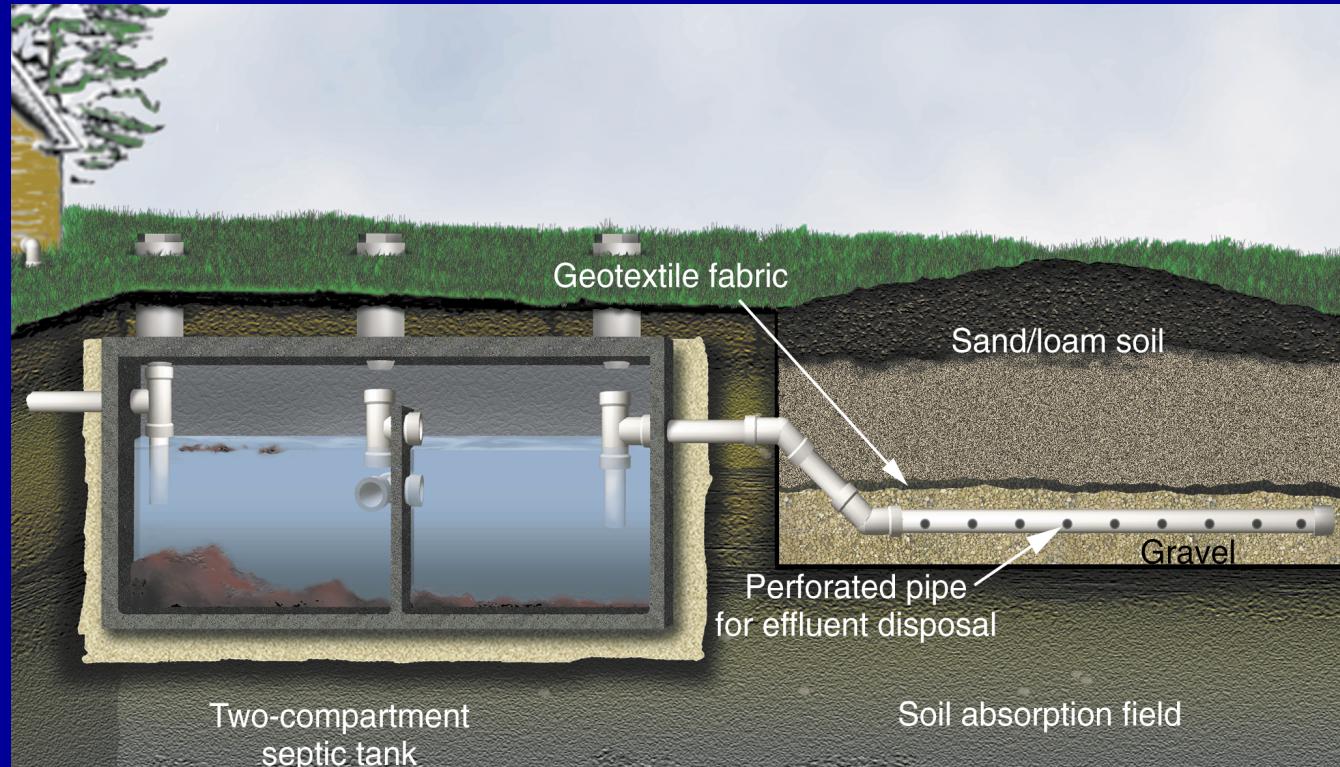


Failing Onsite System



On-Site Wastewater Treatment System Components

- Wastewater source
- Collection
- Pretreatment component
- Final treatment & dispersal component



How do we make the system work?

- Evaluate the wastewater source
- Evaluate site
 - Wastewater treatment
 - Wastewater acceptance
- Choose a final treatment and dispersal component
- Choose the appropriate pretreatment system
- Operation and Maintenance



Types of Facilities - Wastewater Sources

- Restaurants
- Quick Stops
- Strip Malls
- Residences

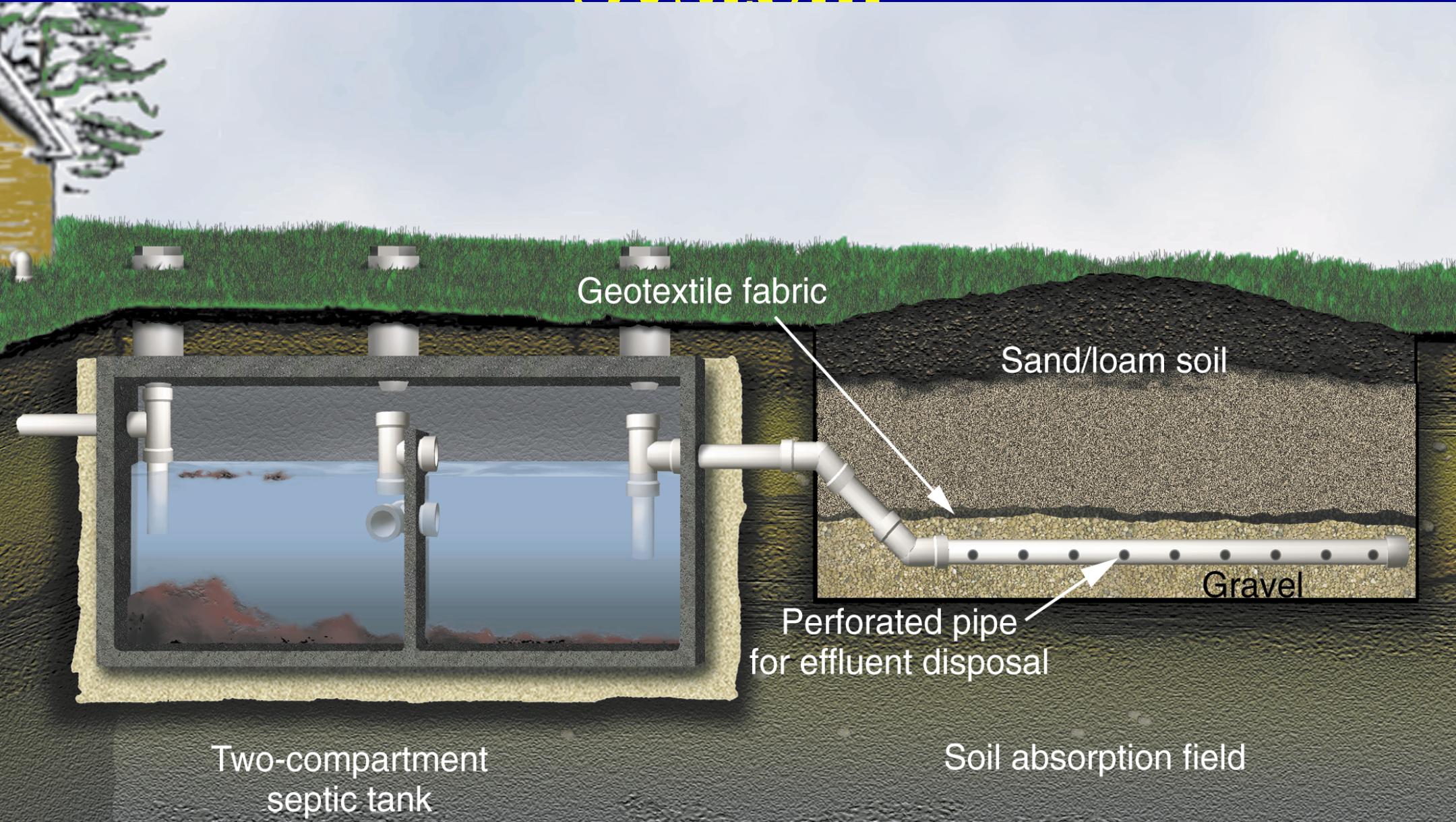


Wastewater Treatment at a Site

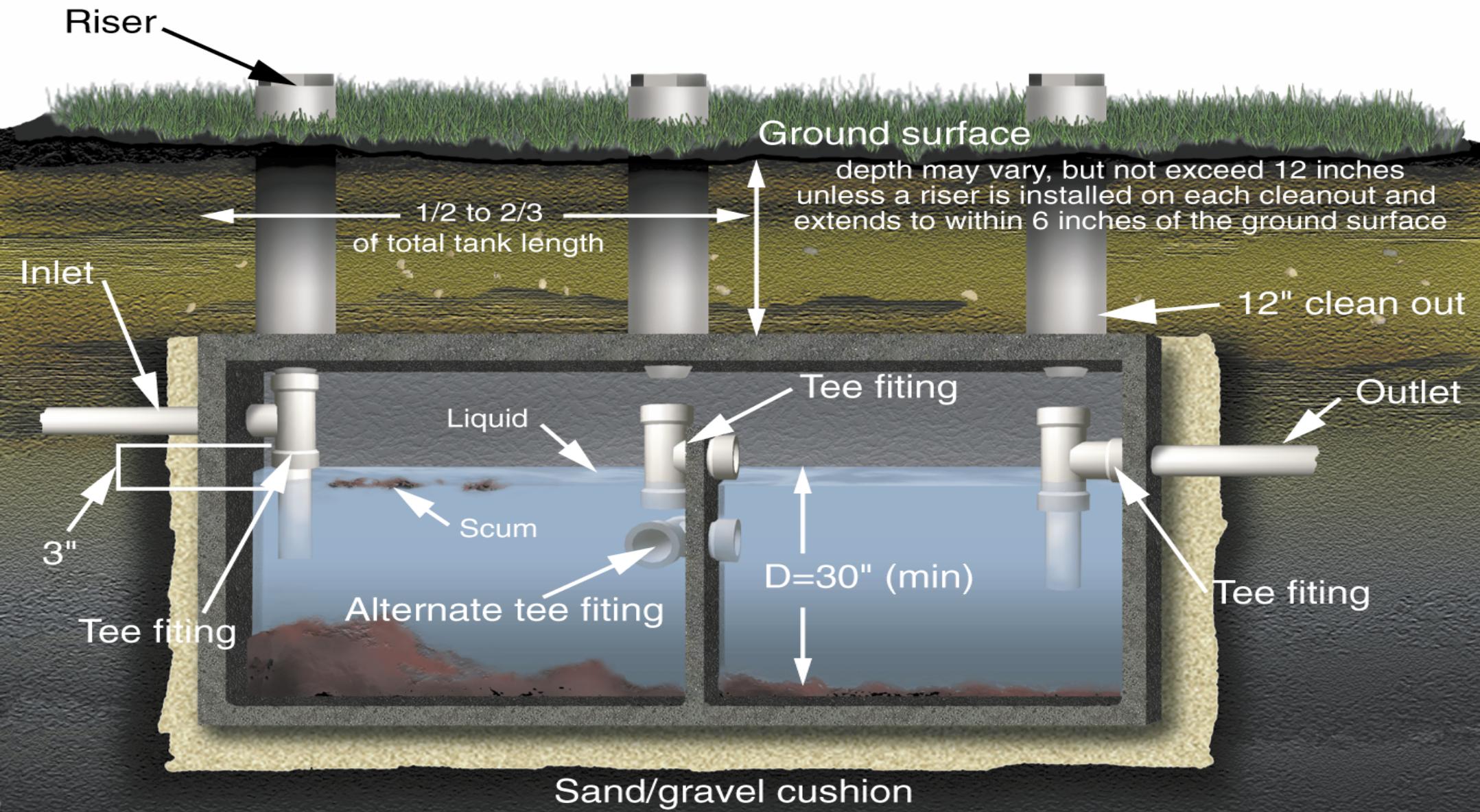
- Soil
 - Type
 - Depth
- Slope
- Restrictive layers
- Separation distances



Conventional Septic Tank System



Two-Compartment Septic Tank



Effluent Filter in Septic Tank Outlet



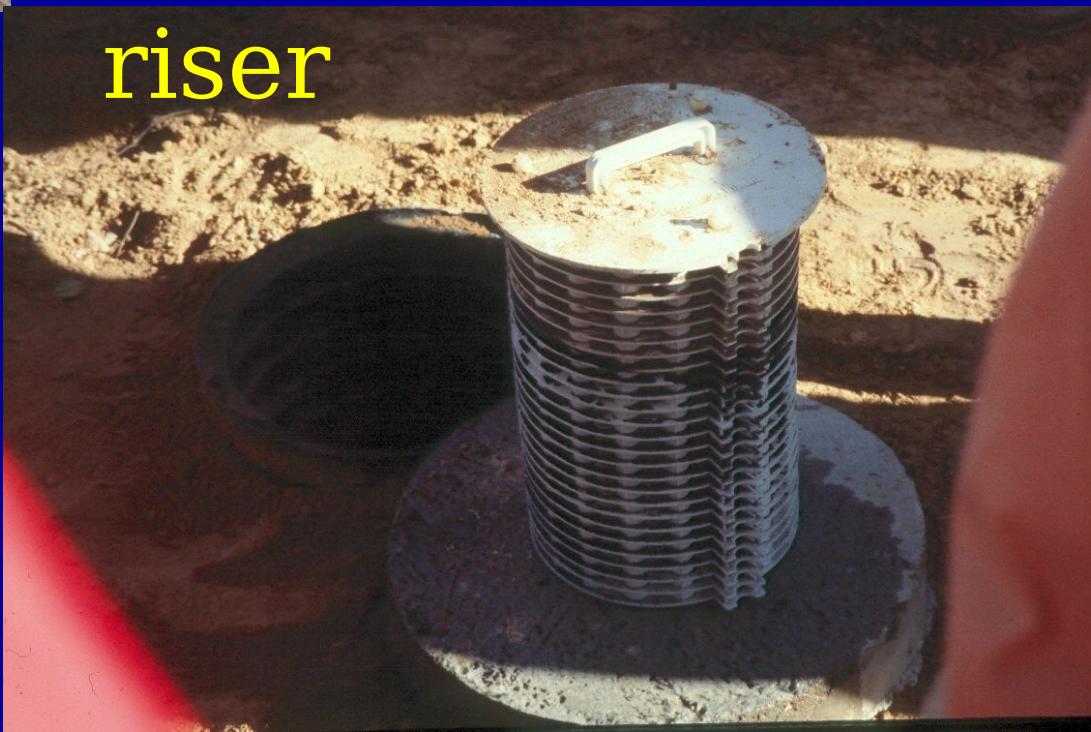
Effluent filter with biological material attached to the surface

Wash biological
material off



Effluent filter holder in septic tank outlet

Placement off-center in the riser





Pumping frequency is a function of system size and loading

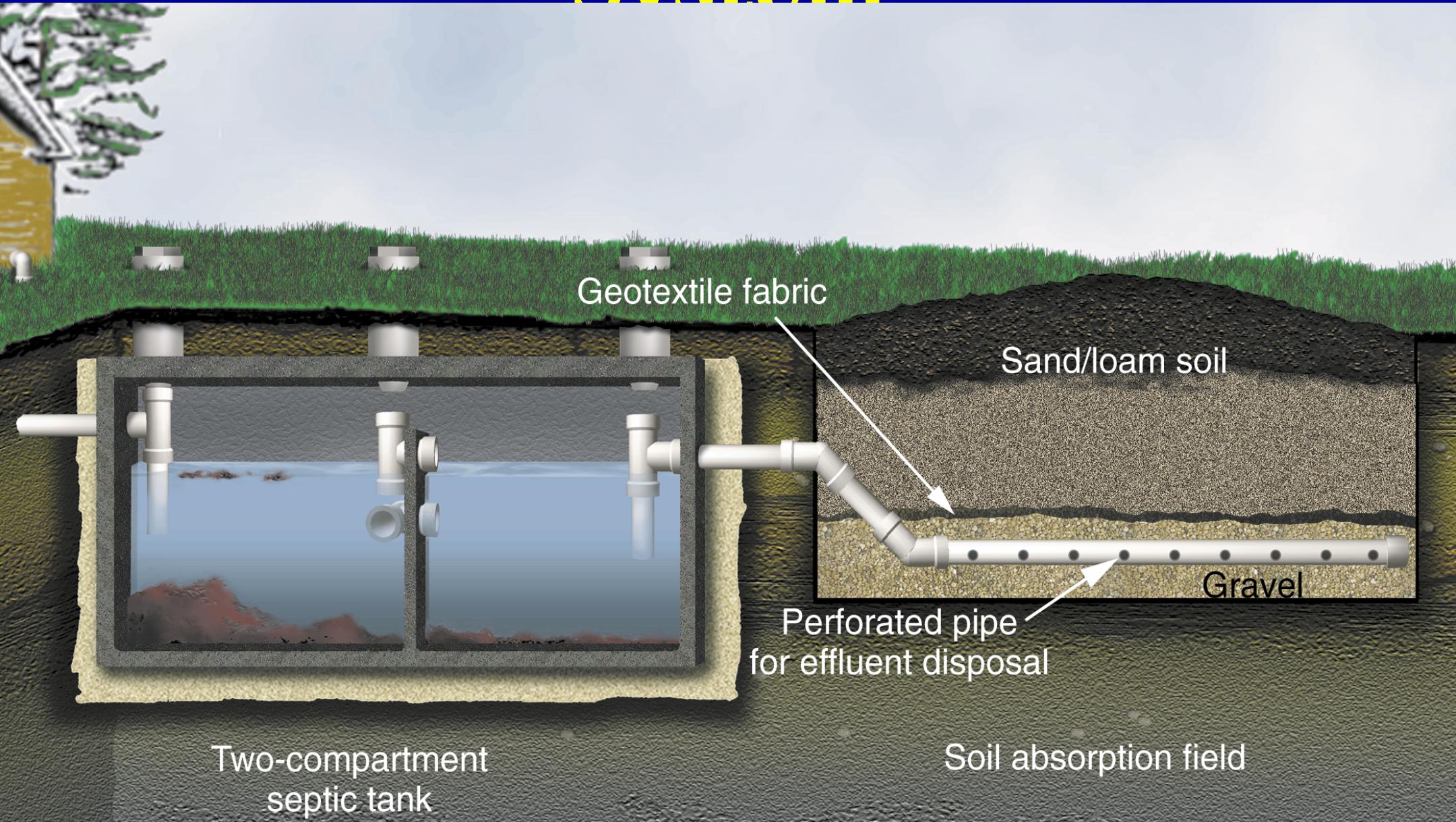
Generally pumping frequency is every two to three years.

Septic tank pumping is a critical component of operation and maintenance.

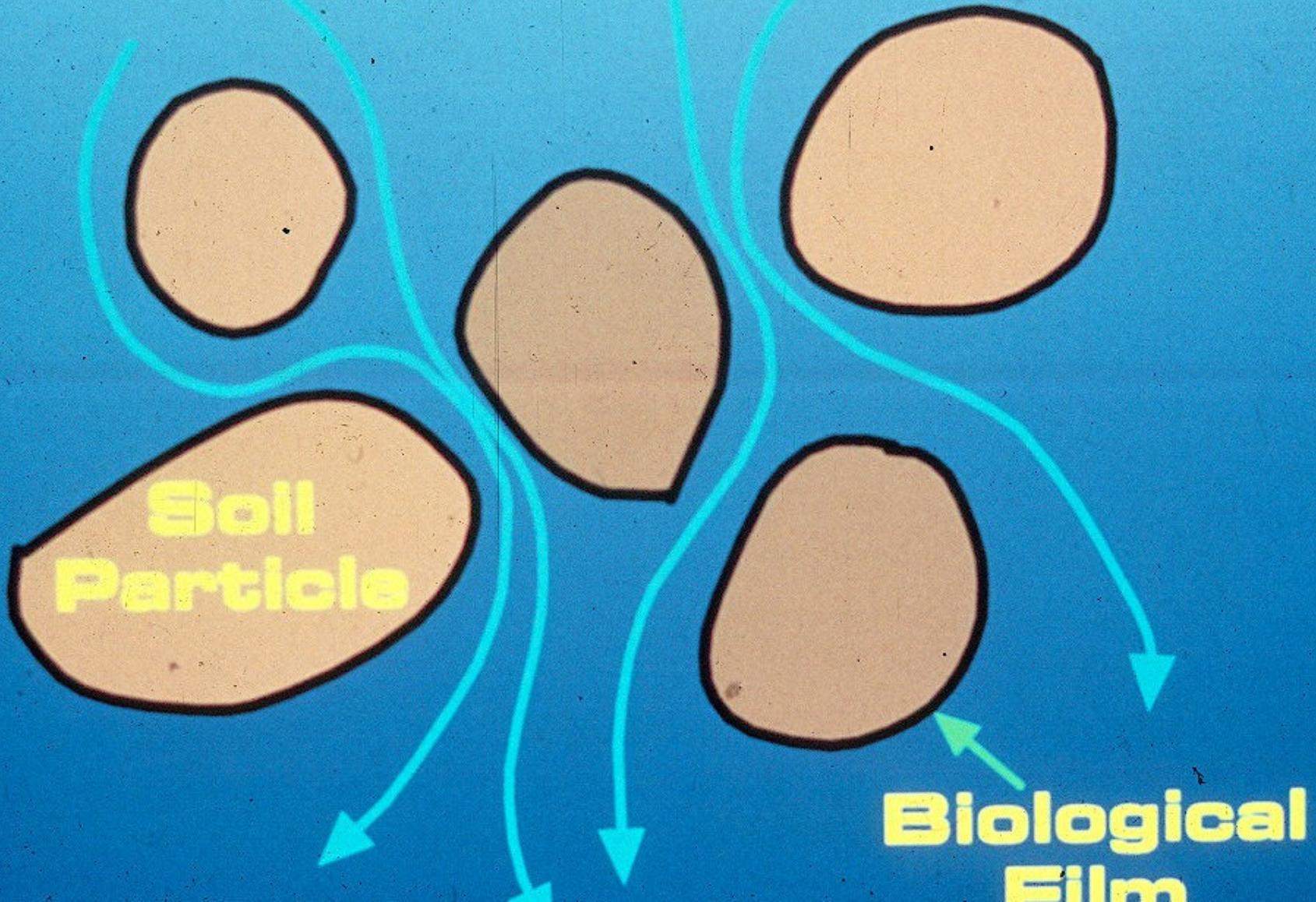
All materials are removed during pumping.



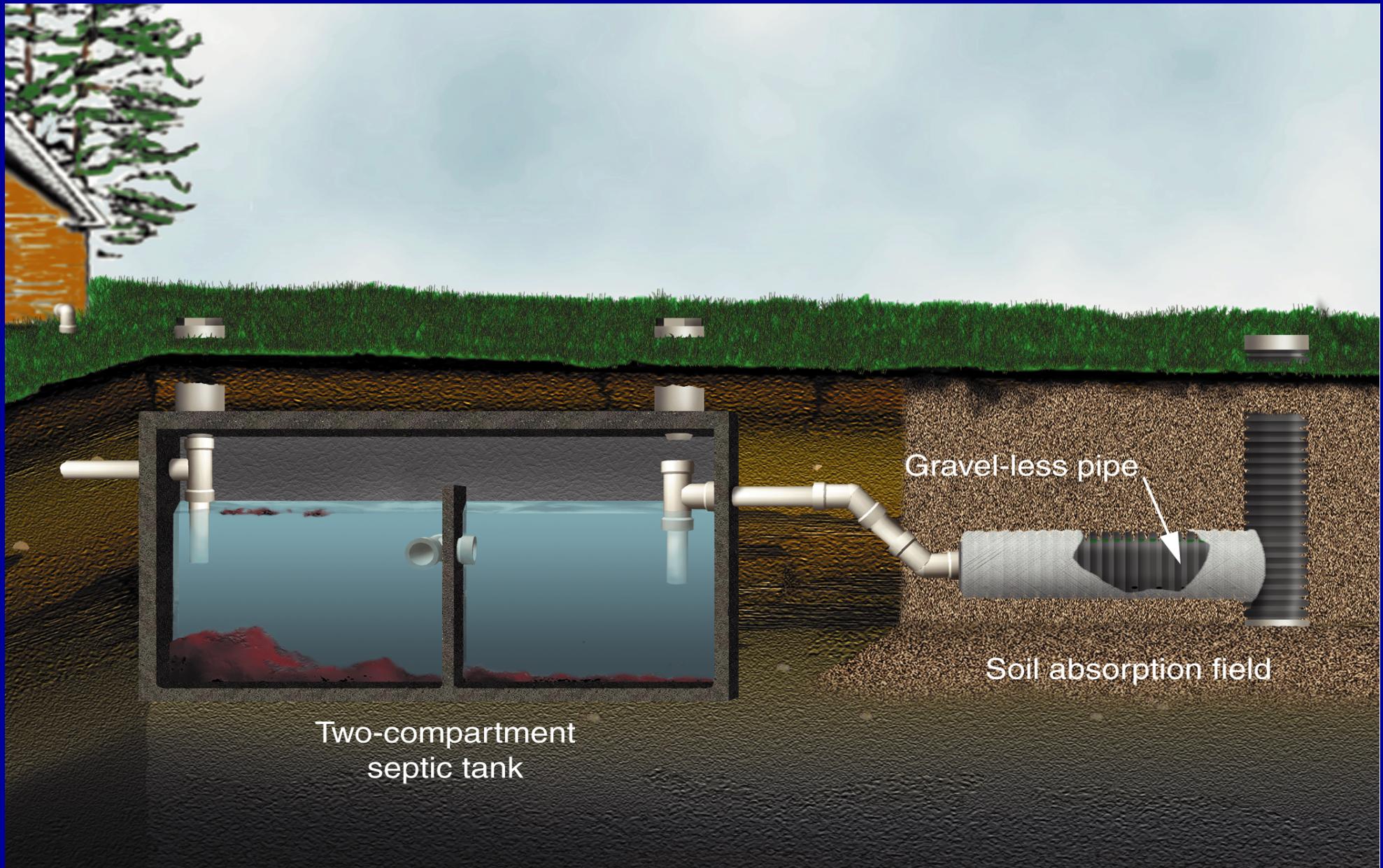
Conventional Septic Tank System



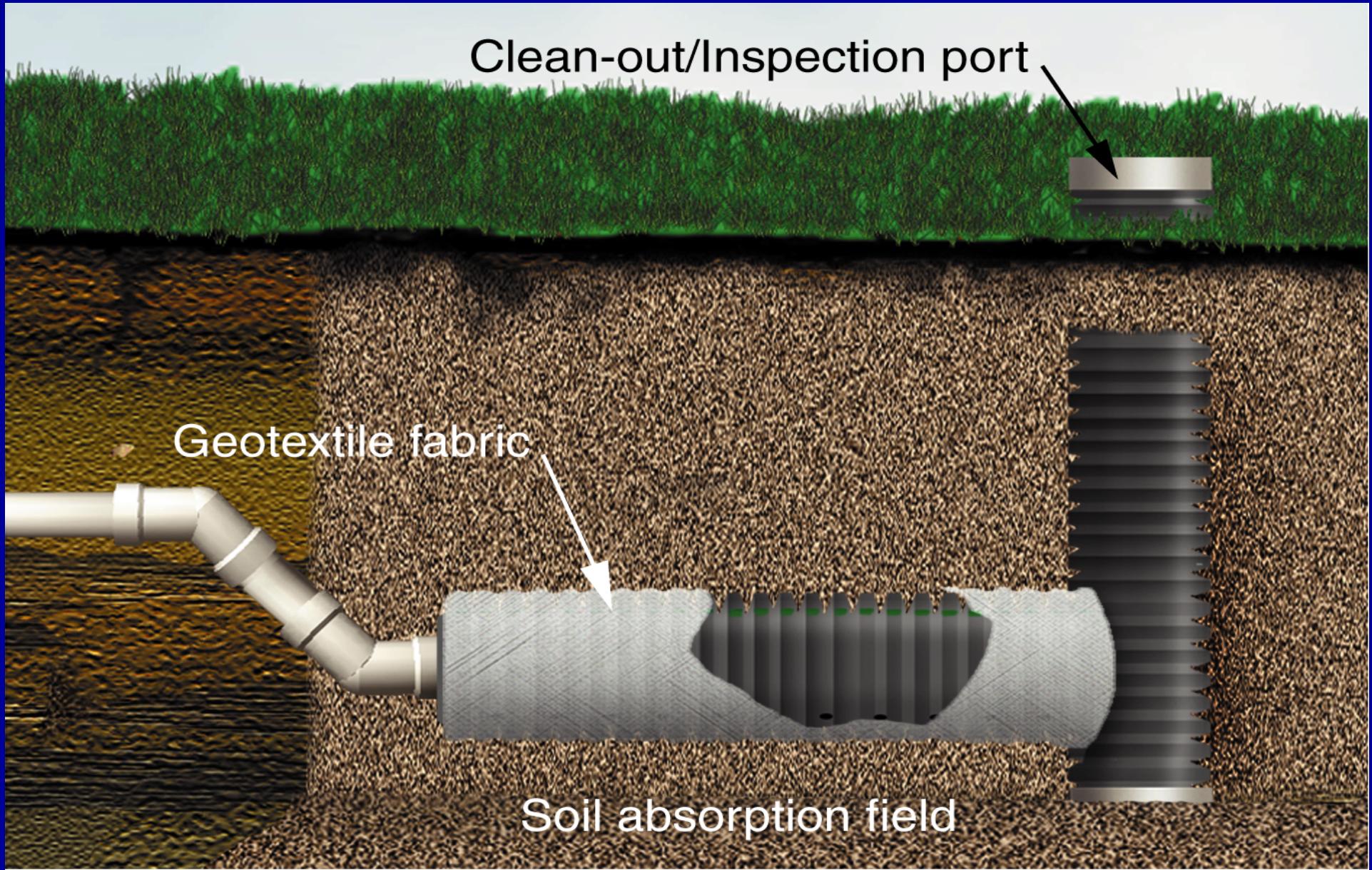
Wastewater



Gravel-less Pipe System



Gravel-less Pipe Drain Field



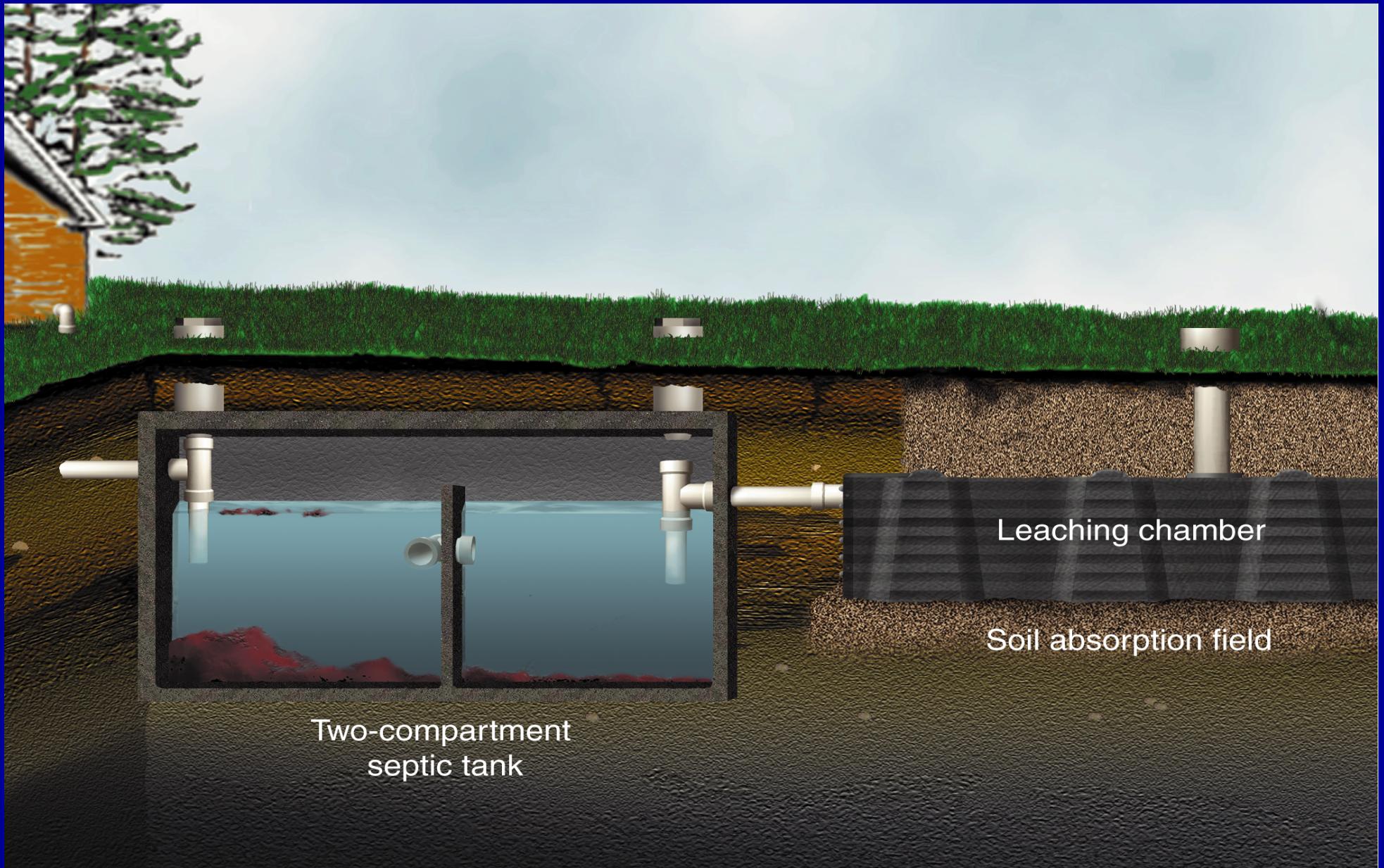


System can be installed to follow contour of the site.

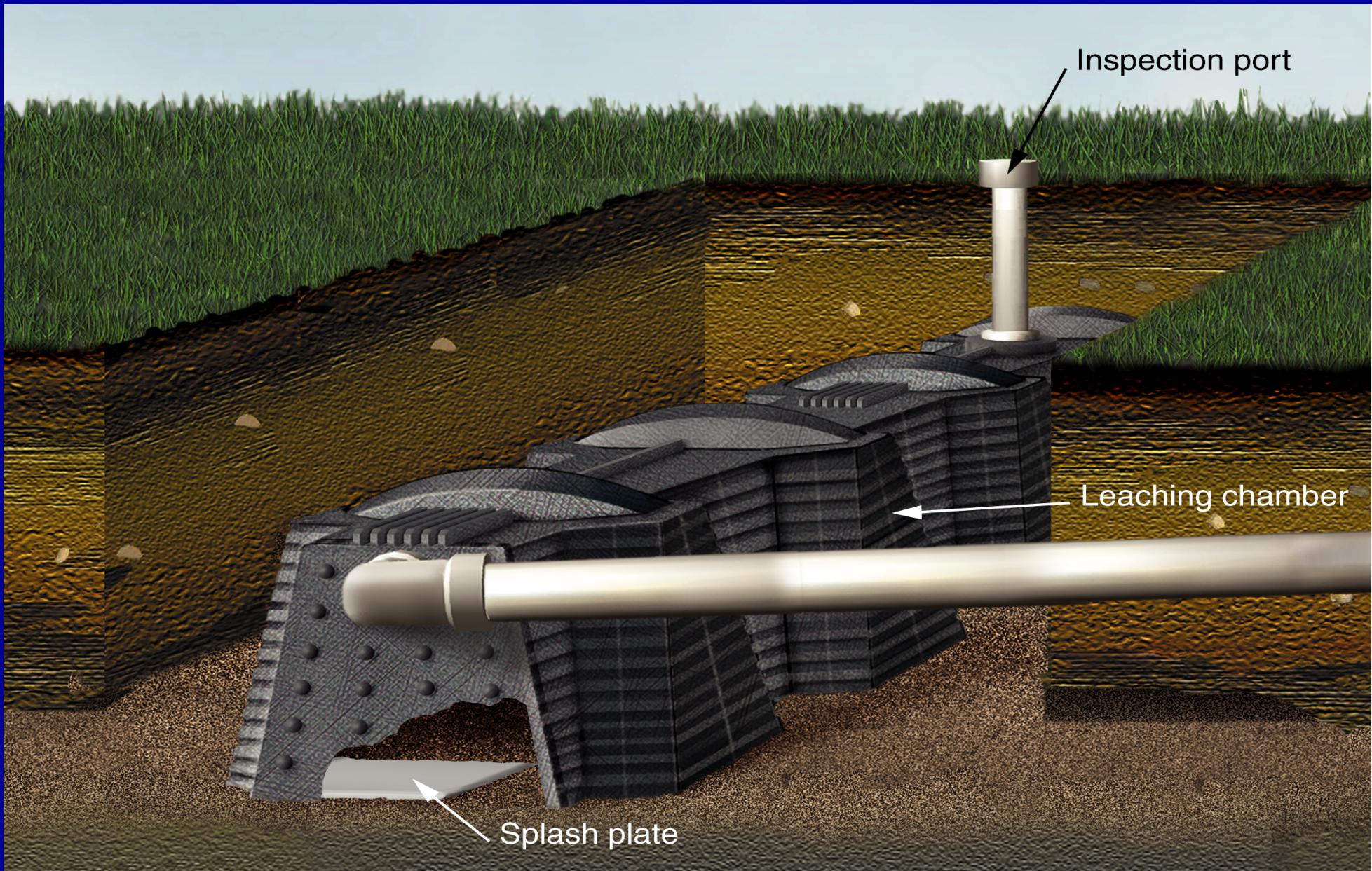
Light-weight for carrying into the site.



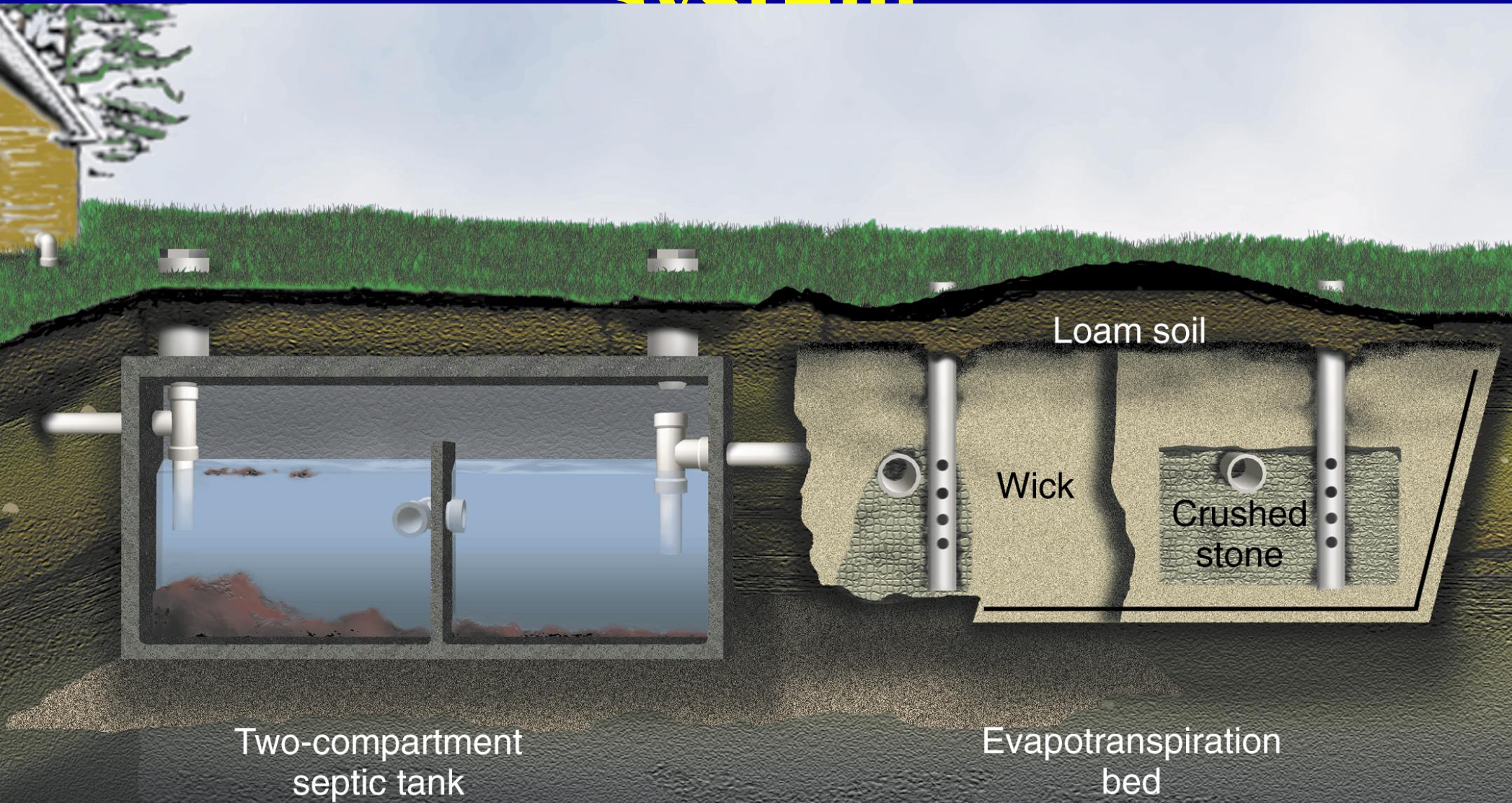
Chamber System



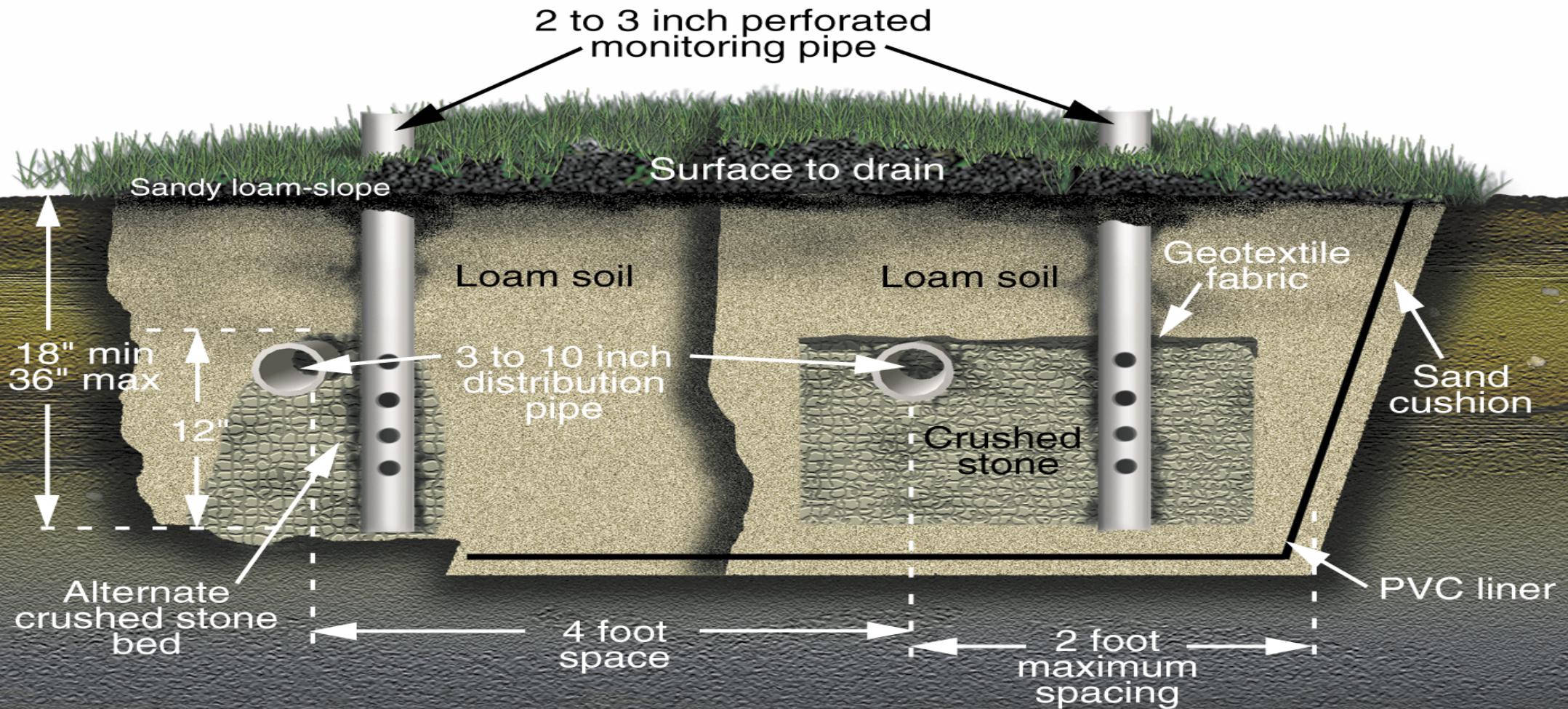
Chamber Drain Field



Evapotranspiration Bed System



Evapotranspiration Bed



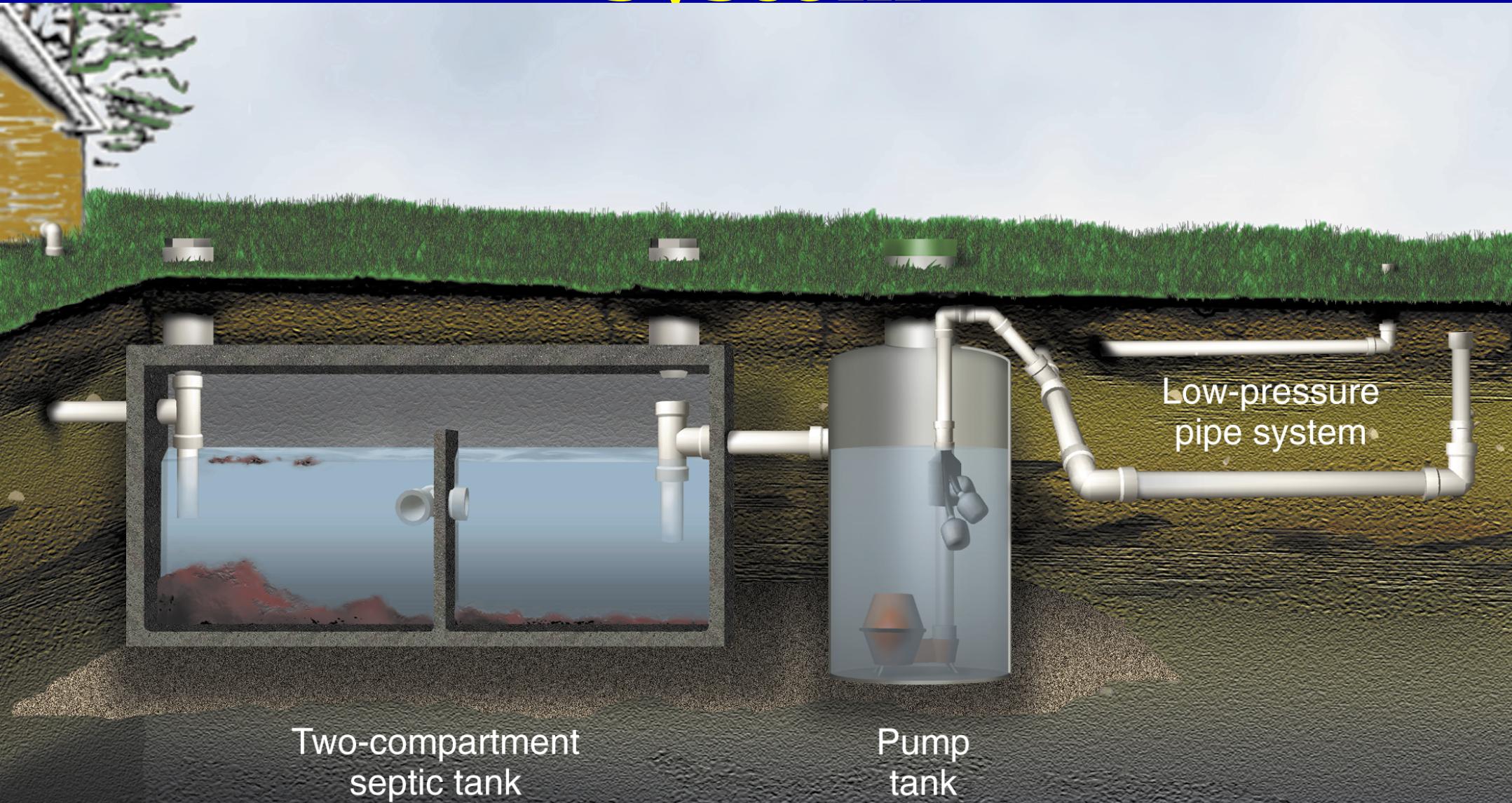


Lined bed below
trailers. Grass
must be
maintained to
ensure vigorous

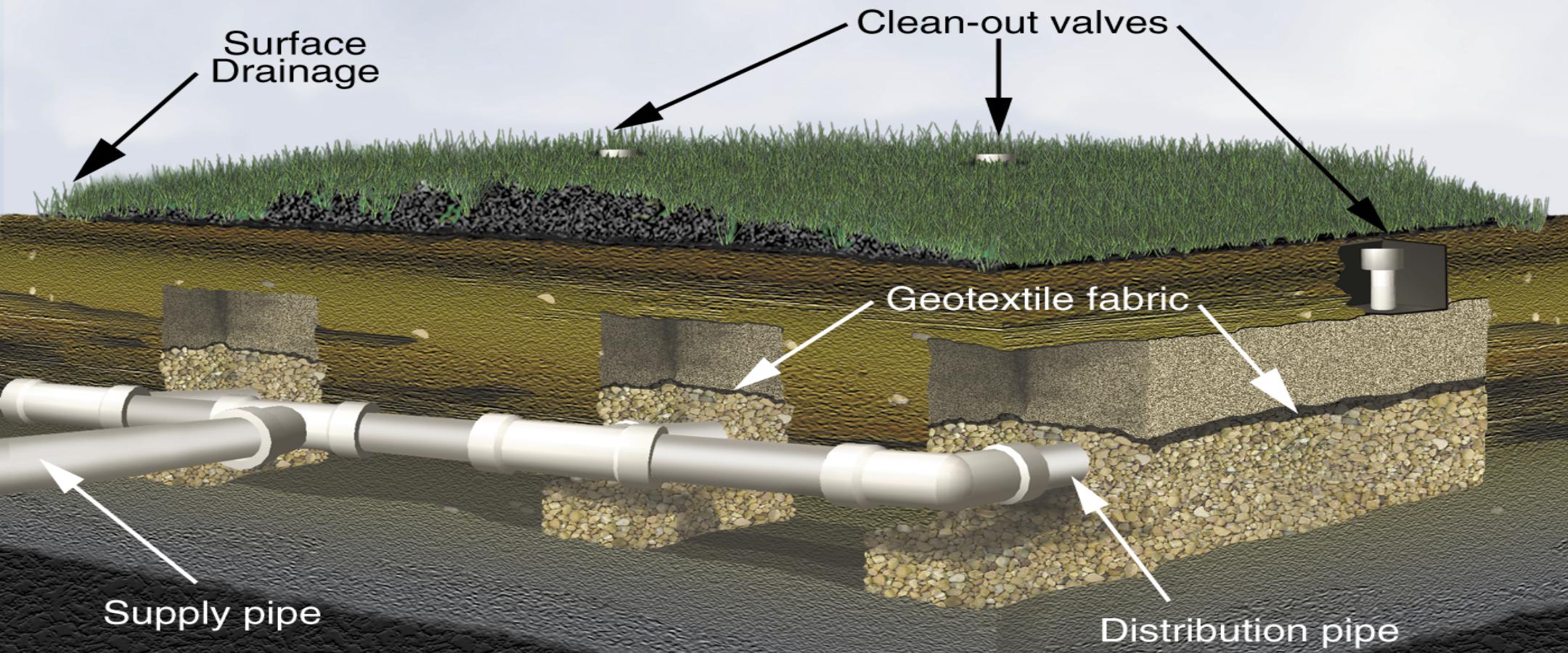
Evapotranspiration
beds for storing
water until
evaporated from
soil surface or
transpired through
plants.



Low-Pressure Distribution System



Low-Pressure Distribution Drain Field



Low pressure
distribution based on
balanced flow of water.

Check for blocked
emitters.

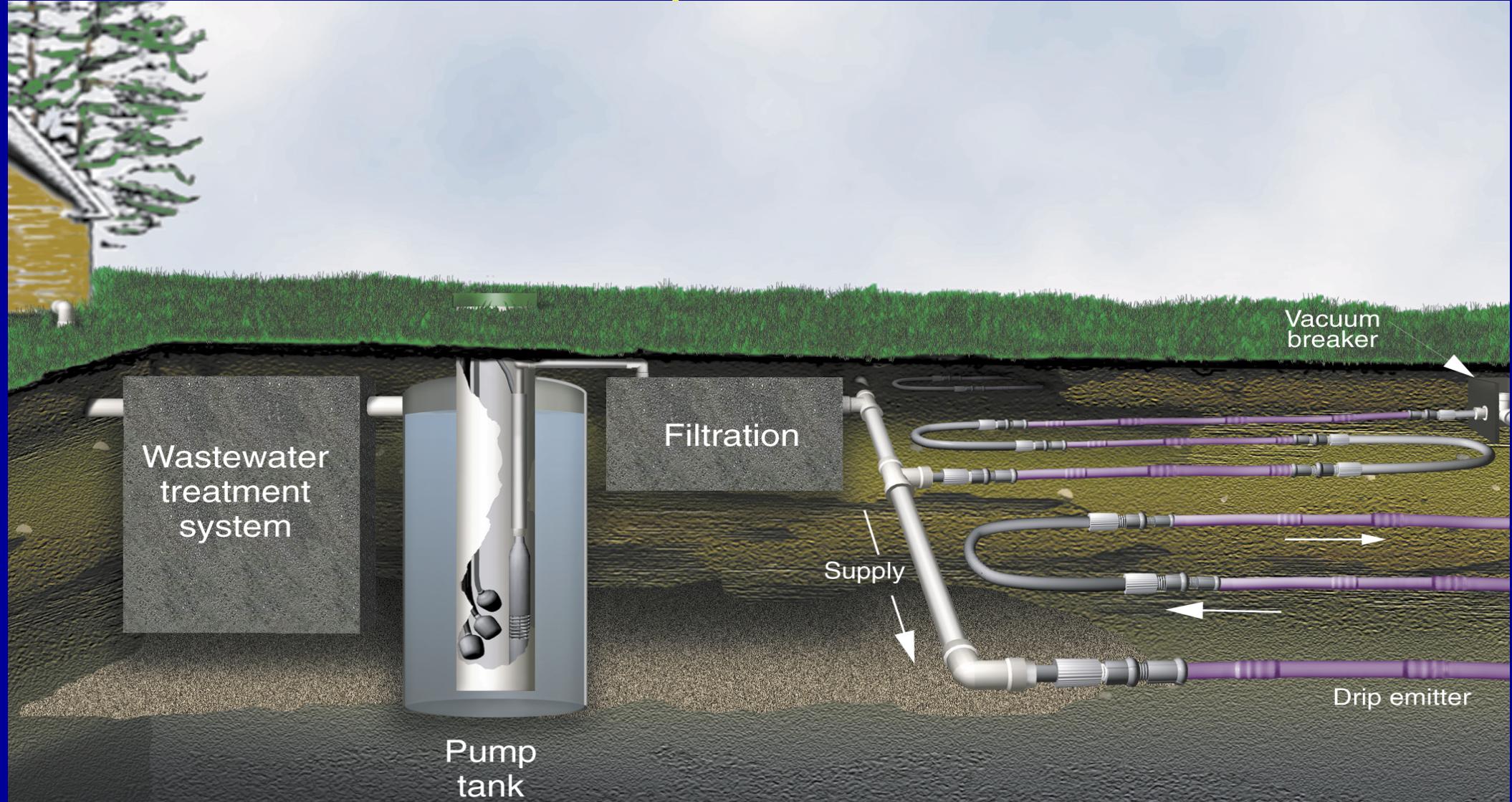
Flush lines.



Low Pressure Distribution Drain Field



Sub-Surface Drip Dispersal System



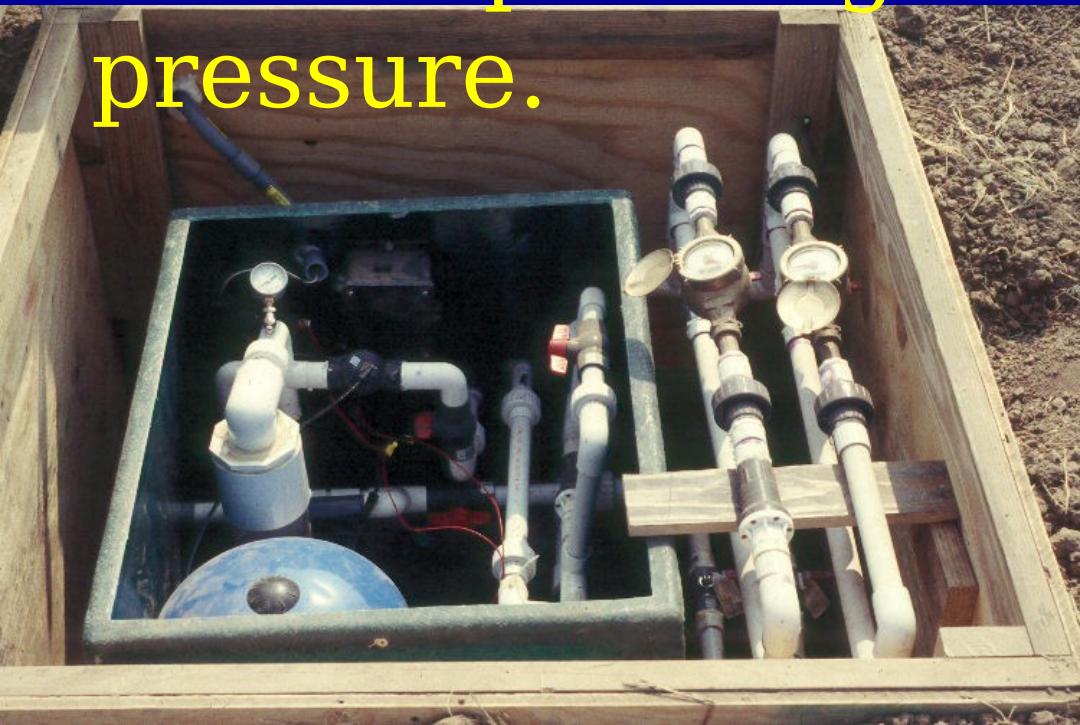
Check filtering system (make sure automatic backwash is functional.)

Check the filter (and backwash valve)

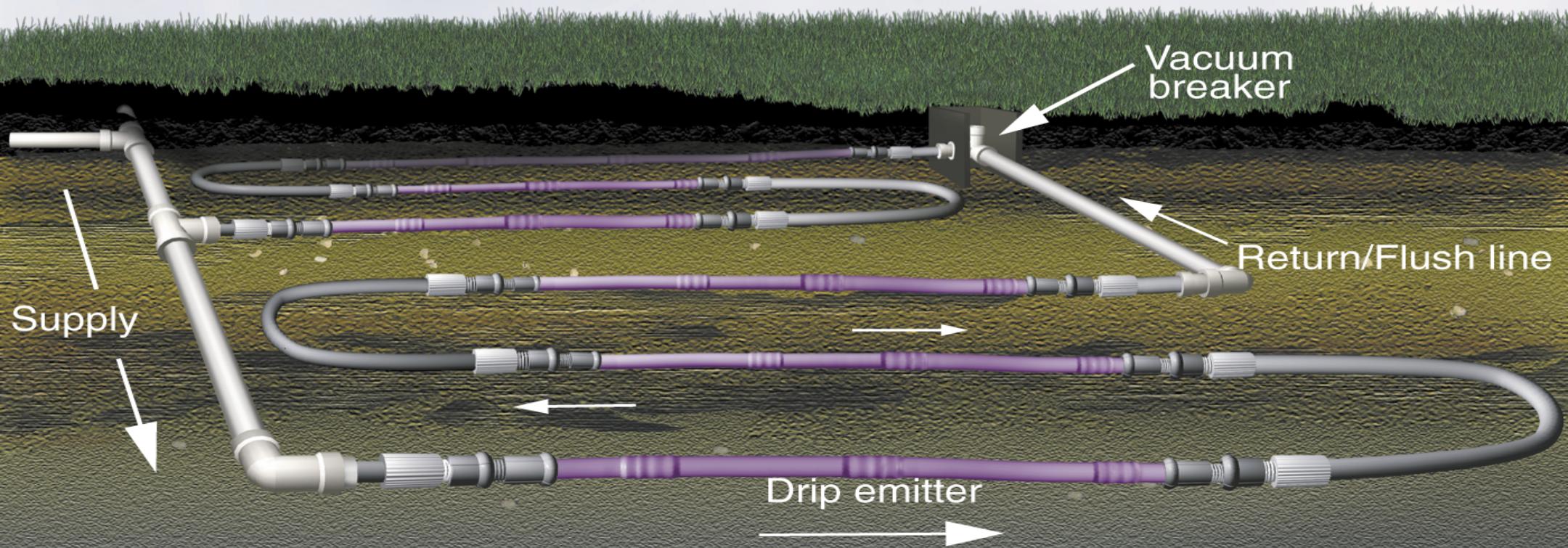


Check the control panel (pump run times, number of cycles, etc.)

Check operating pressure.



Subsurface Drip Dispersal Drain Field



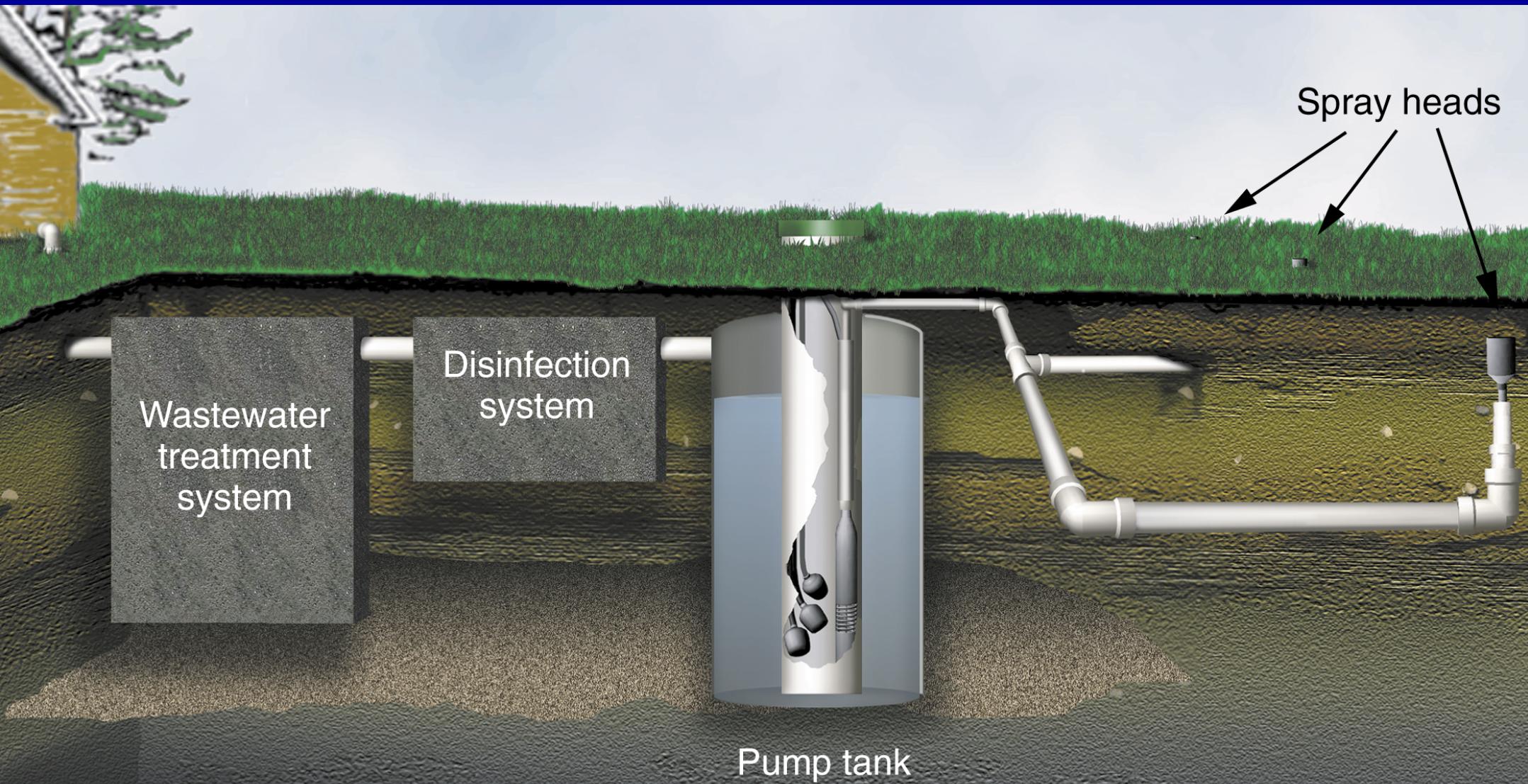
Subsurface Drip Tubing



Drip Dispersion Field at a School

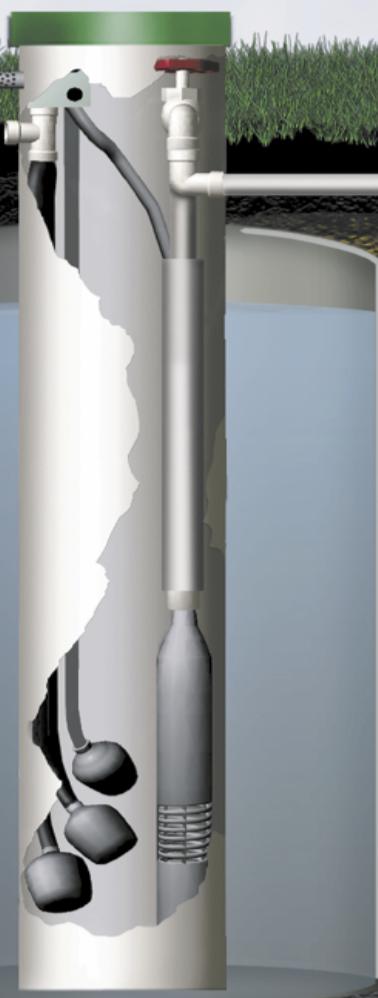


Spray Dispersal System



Spray Dispersal

Pump tank



Spray heads



Wastewater spraying in a landscaped bed and yard.

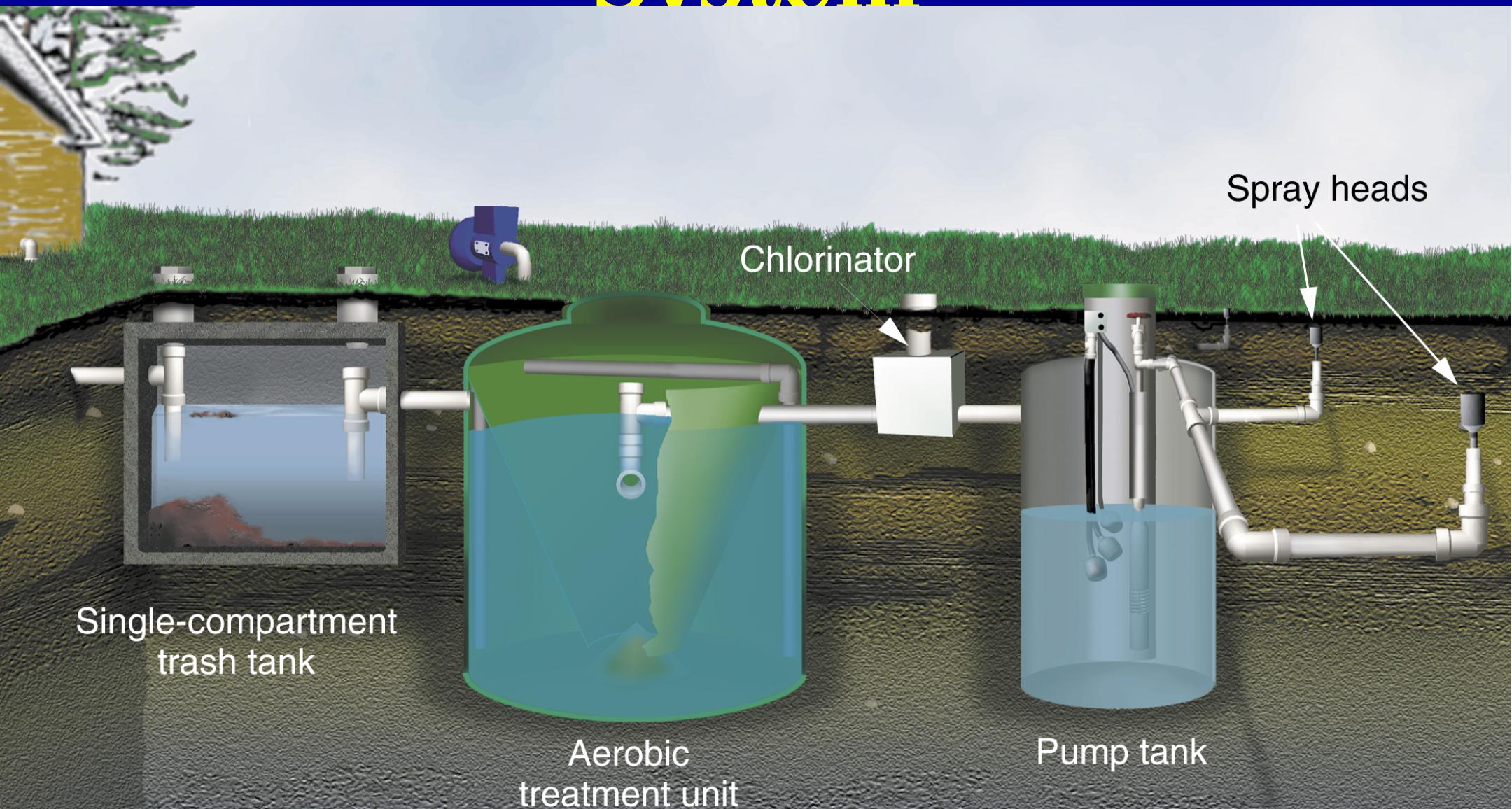
Check operating pressure of the system.

Check the spray heads to make sure they are not broken.

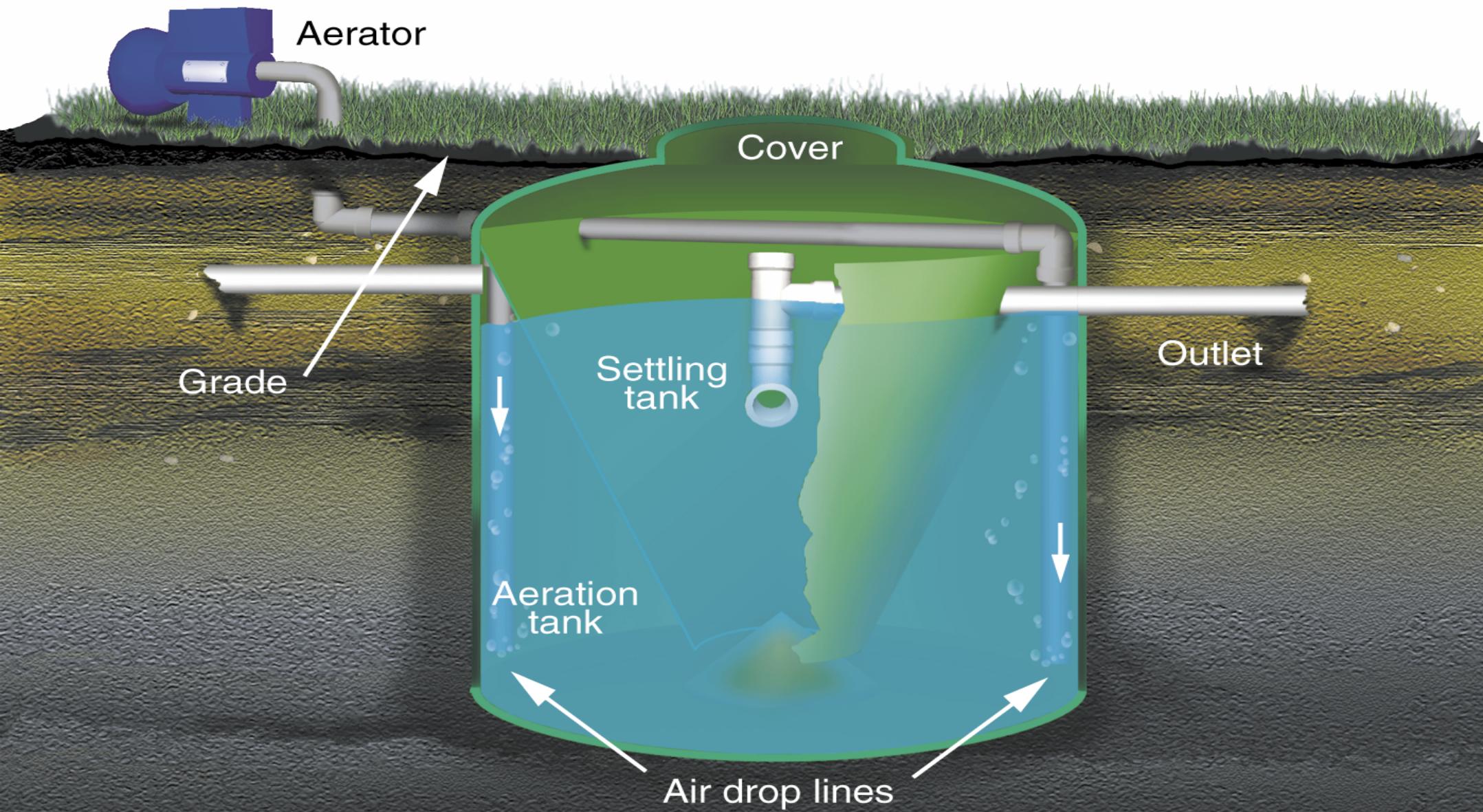
Check spray direction and



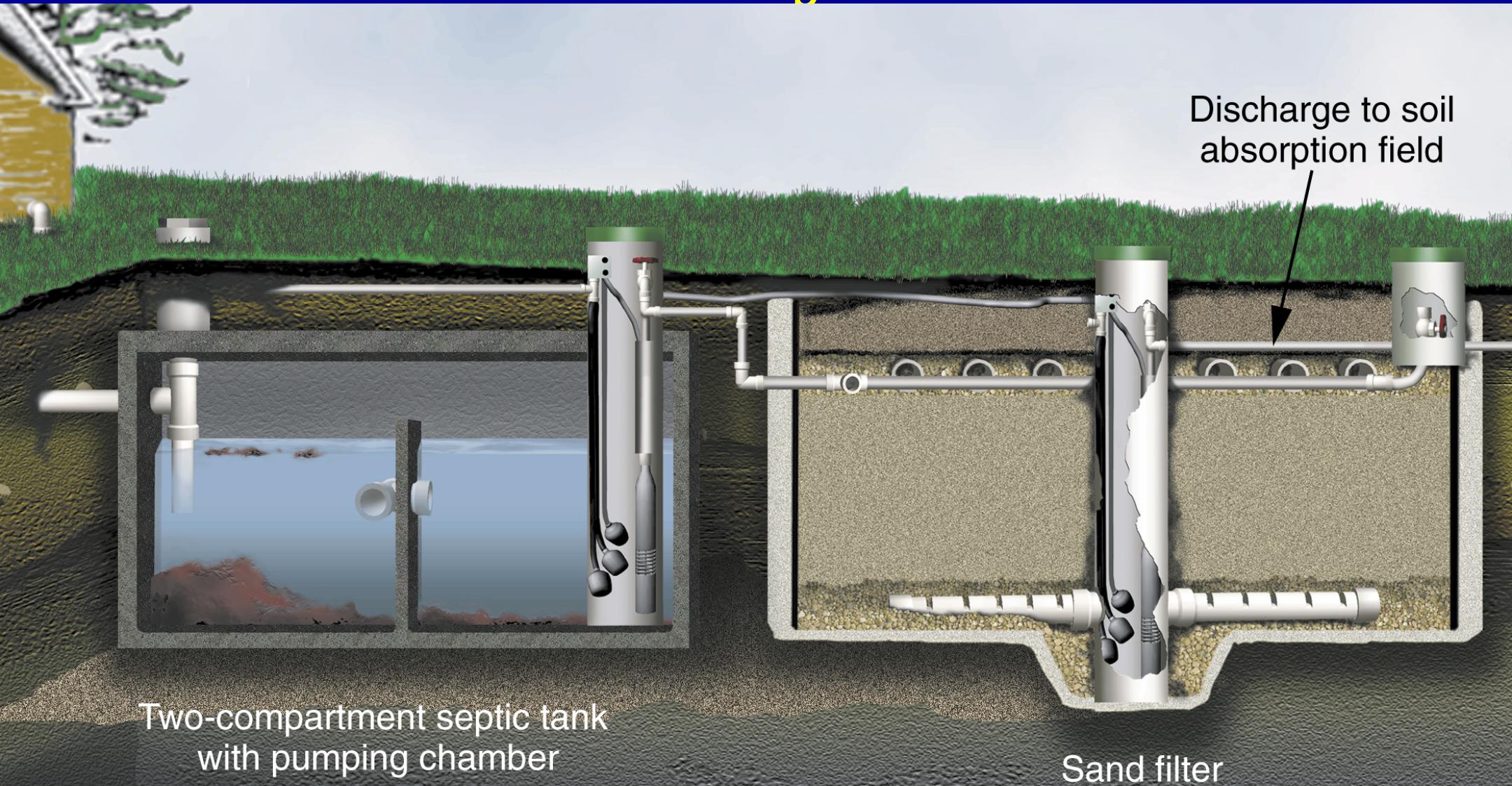
Aerobic Treatment Unit System



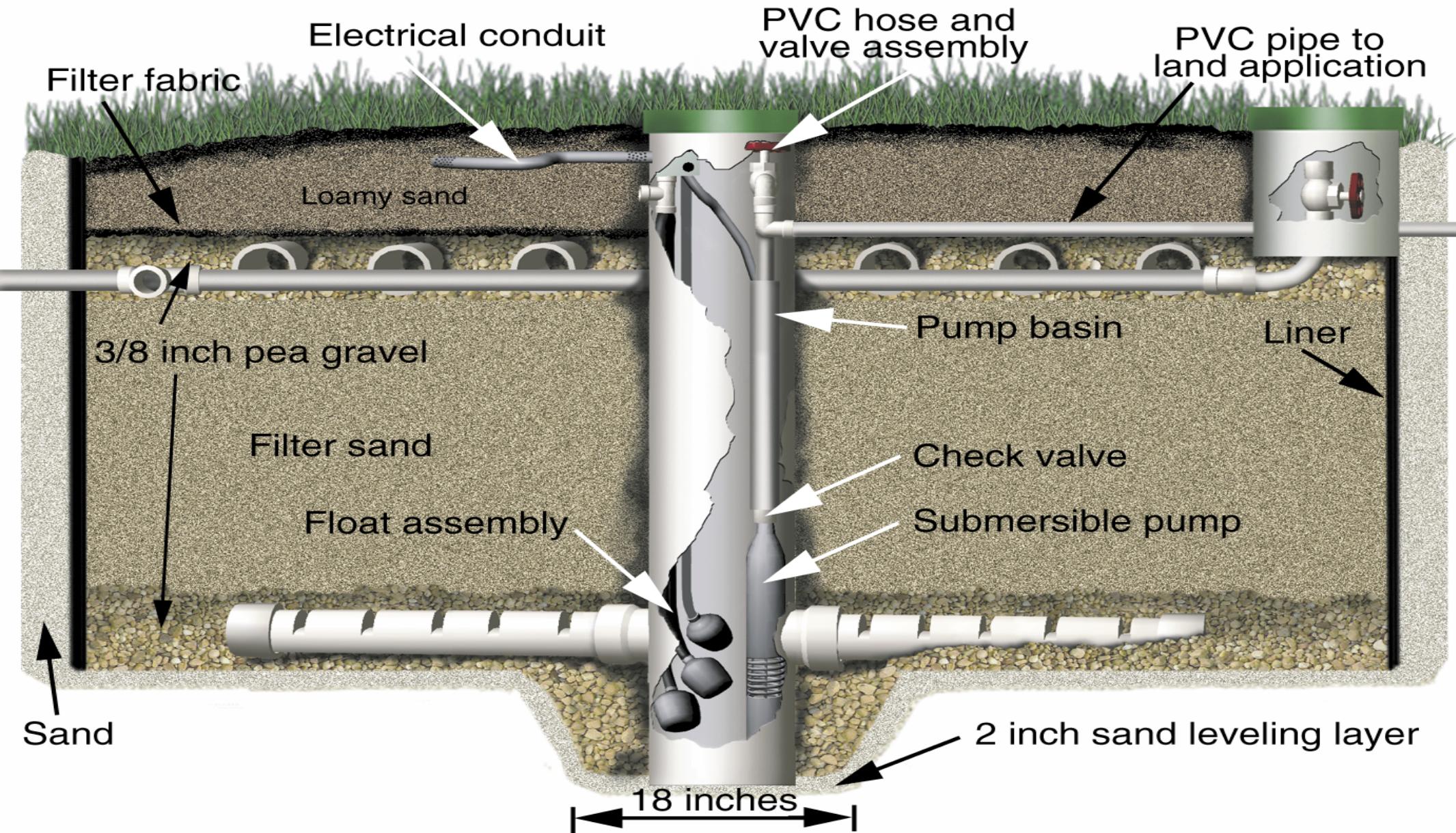
Aerobic Treatment Unit



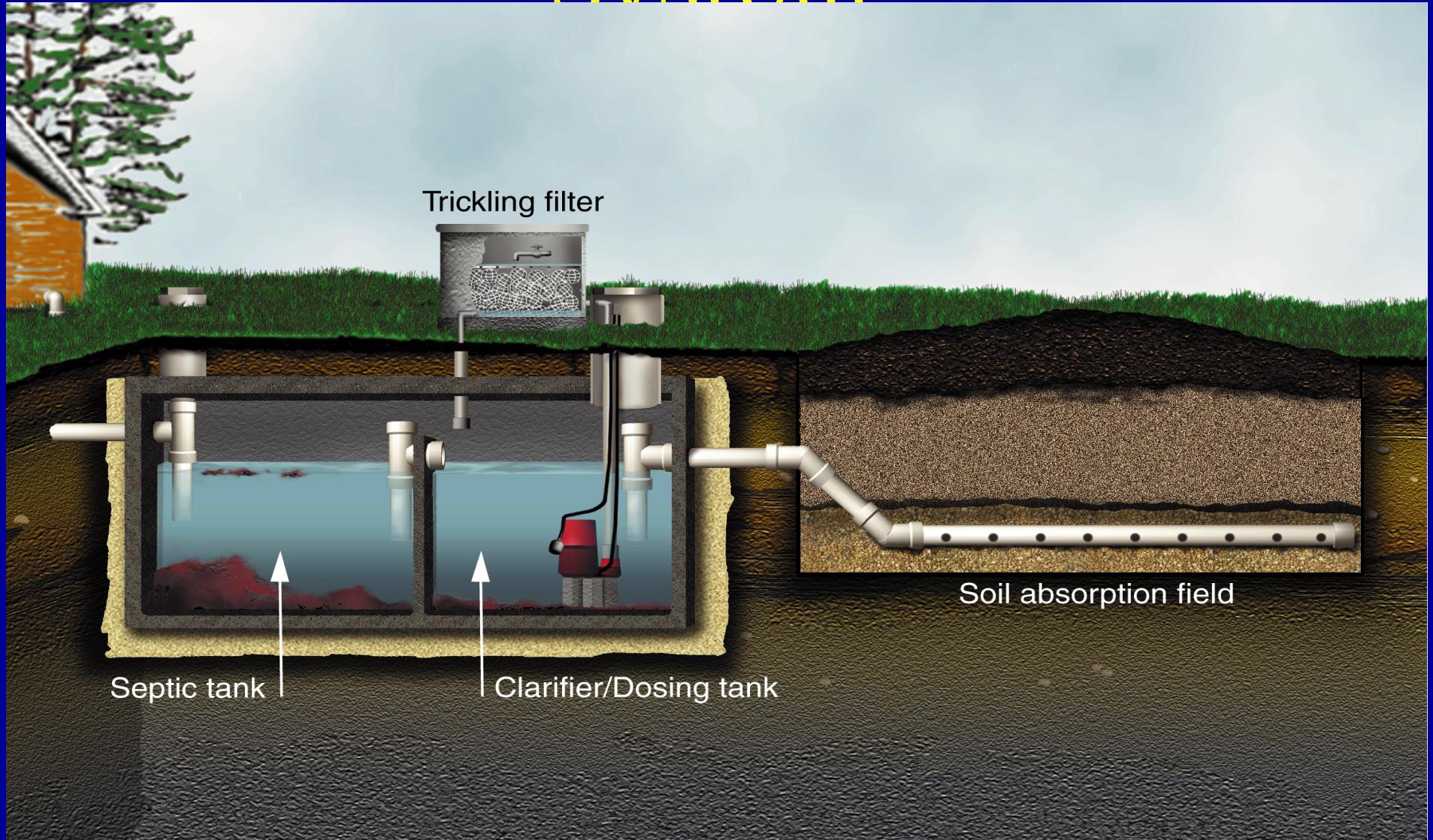
Buried Intermittent Sand Filter System



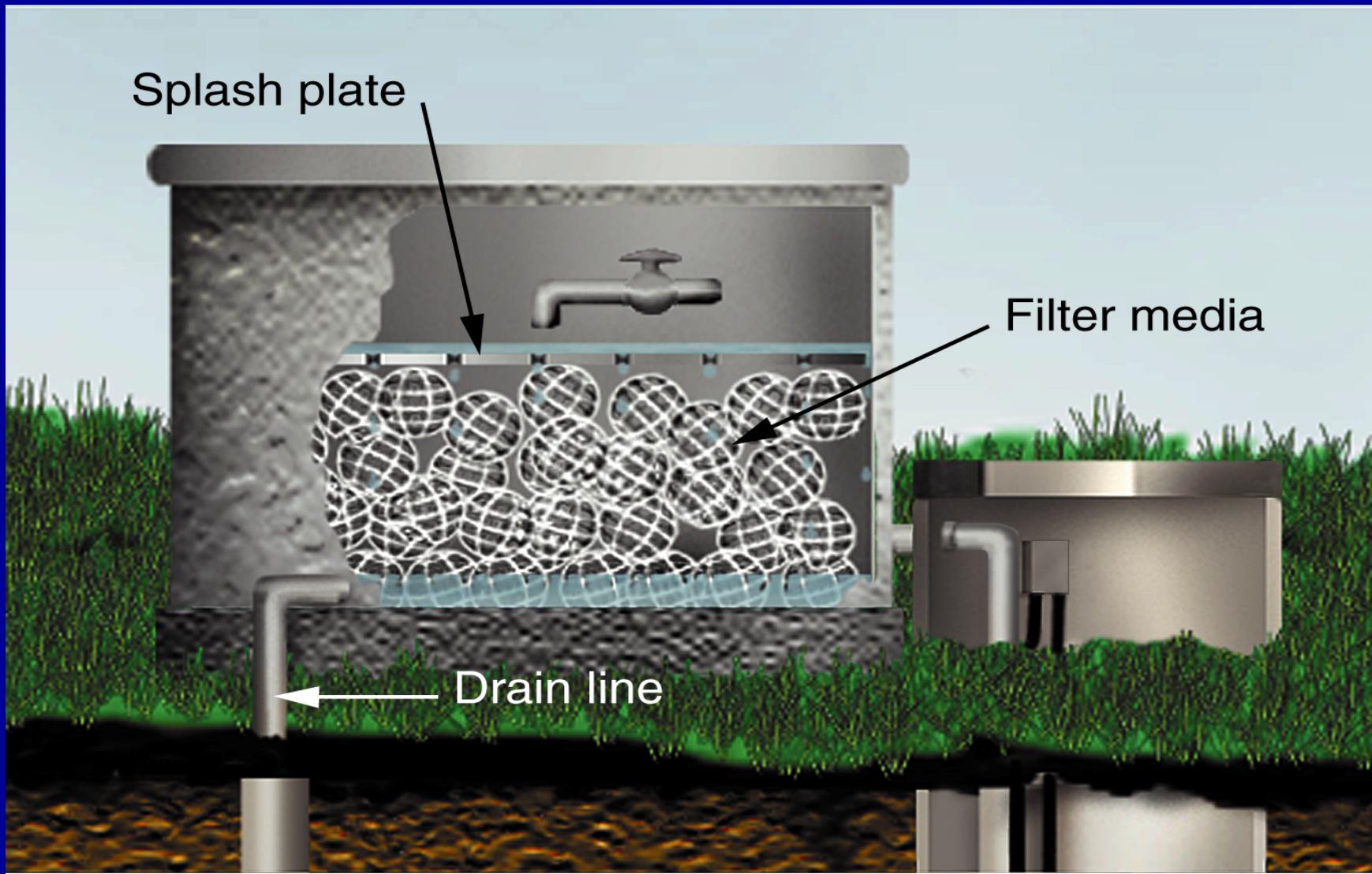
Buried Intermittent Sand Filter



Recirculating Media Filter System



Recirculating Media Filter



Gravel Media Filter





Check water infiltration into bed.

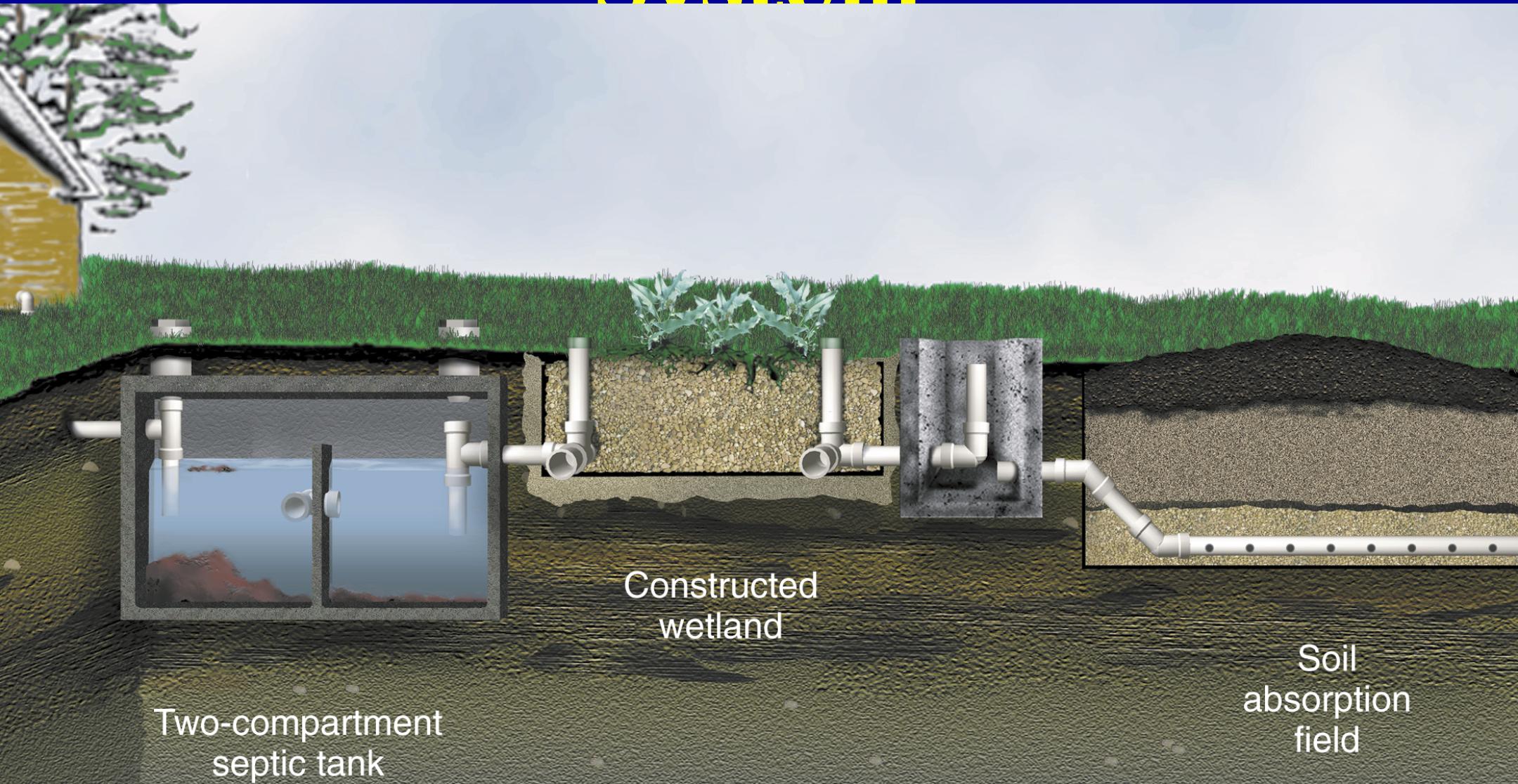
Disturb crust developing on the surface.

Replace top portion of

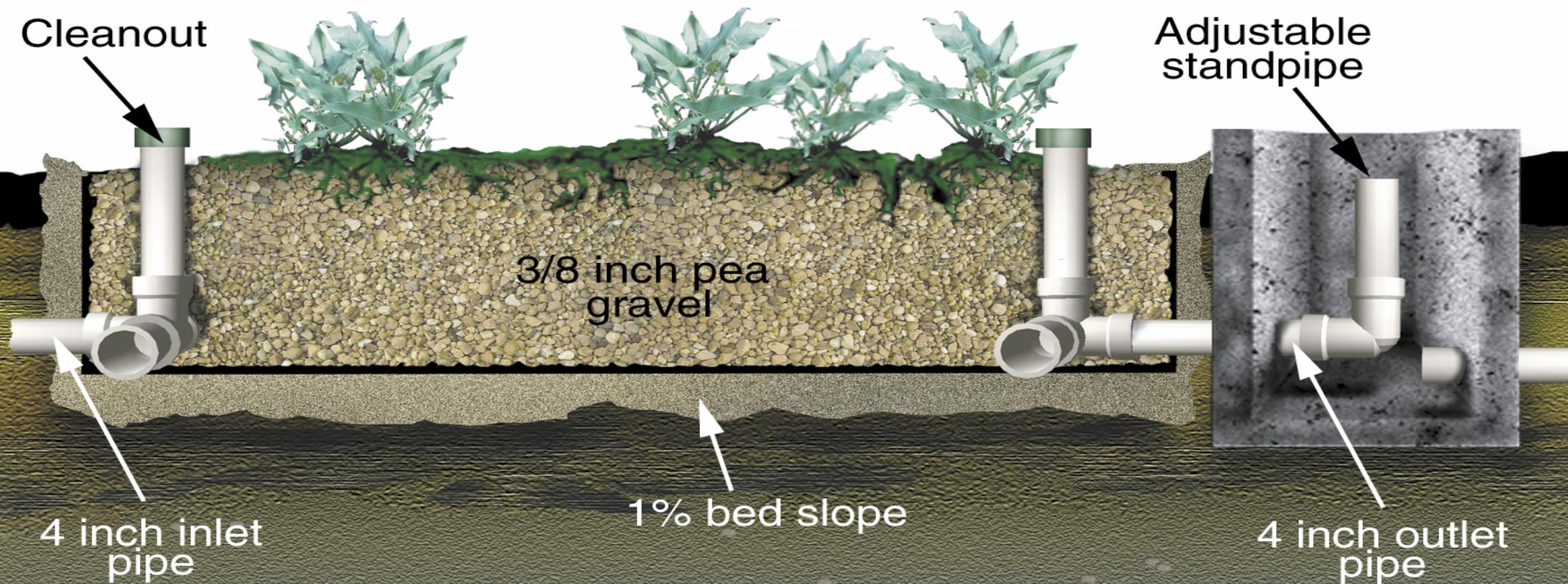
Sand filter needs uniform distribution of the water.
Check loading rate on the media.



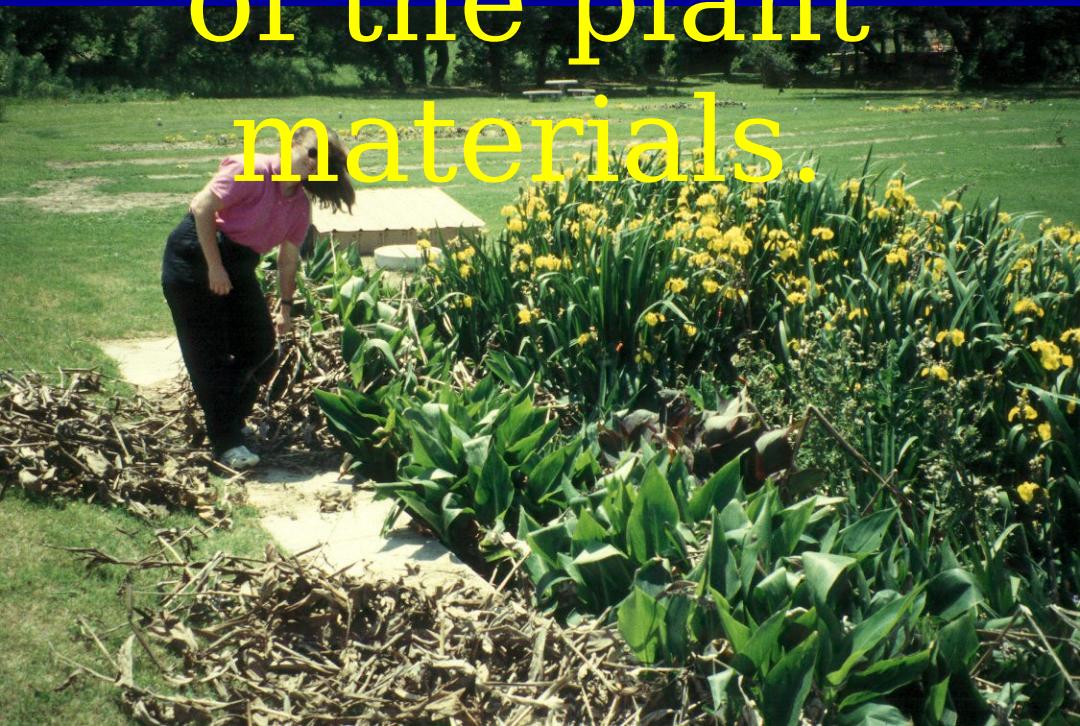
Constructed Wetland System



Constructed Wetland



Wetland
systems
require
management
of the plant
materials.



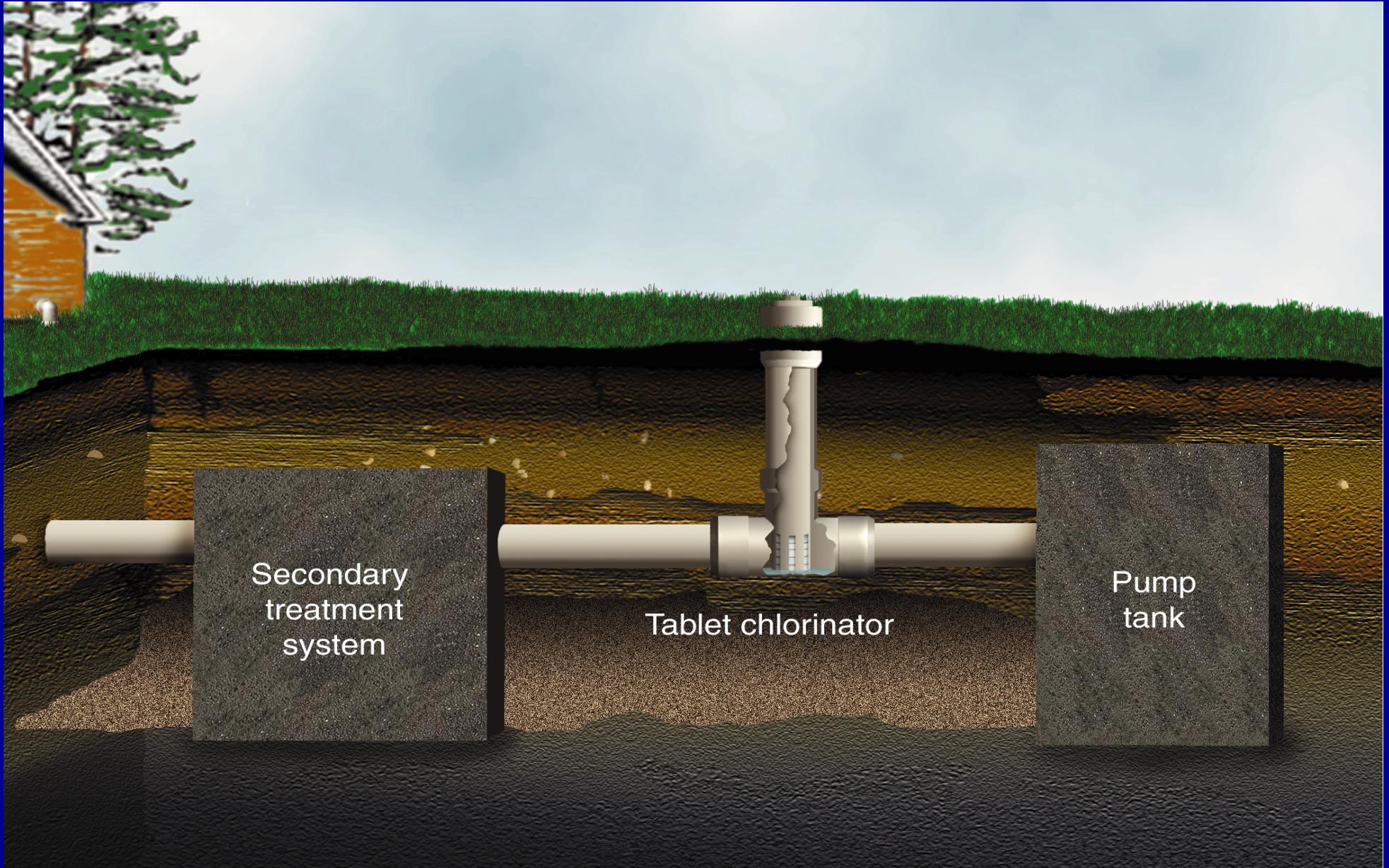
Residential Constructed Wetland



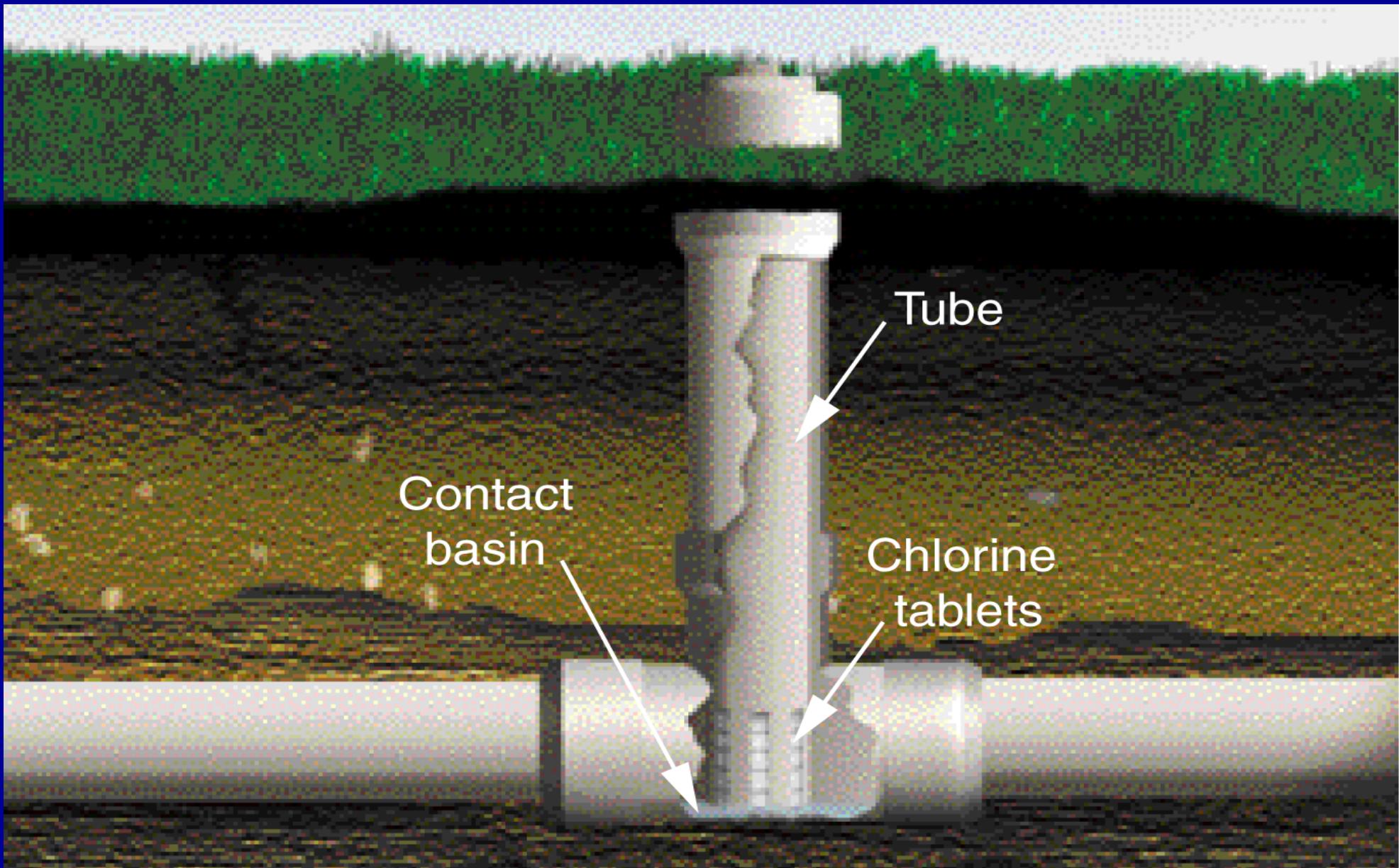
Disinfection

- Chlorination
 - Tablet
 - Liquid
 - Gas
- UV Light
- Ozonation

Tablet Chlorination System



Tablet Chlorinator



Chlorine Tablets in the Stack Tube



Water Quality Monitoring / Operation and Maintenance

- Monitoring system performance
- All systems require operation and maintenance
 - Frequency
 - Types of activities
 - Types of inputs



Summary

- A site evaluation is critical to determining the potential for a site to treat wastewater.
- Advanced pretreatment and final treatment and dispersal technologies are available for most situations.
- Select the most appropriate technology and scale of system for your site.
- Operation and maintenance is critical for long-term function